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New Uintan and Duchesnean (Middle and Late Eocene) Rodents from the Sespe Formation, Simi Valley, California

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Abstract.—A paleontologic impact mitigation program being conducted at the Simi Valley Landfill in southern California is yielding new species and new geologic and geographic occurrences of middle and late Eocene rodents representing the families Eomyidae, Heliscomyidae, Simimyidae, and ?Zapodidae from the middle member of the continental Sespe Formation. These rodents include "*Namatomys*" sp., cf. "*N.*" *fantasma* Lindsay, "*Namatomys*" sp., *Paradjidaumo reynoldsi* new species, *Heliscomys* sp., *Simimys landeri* new species, and *Simiacritomys whistleri* new genus and species.

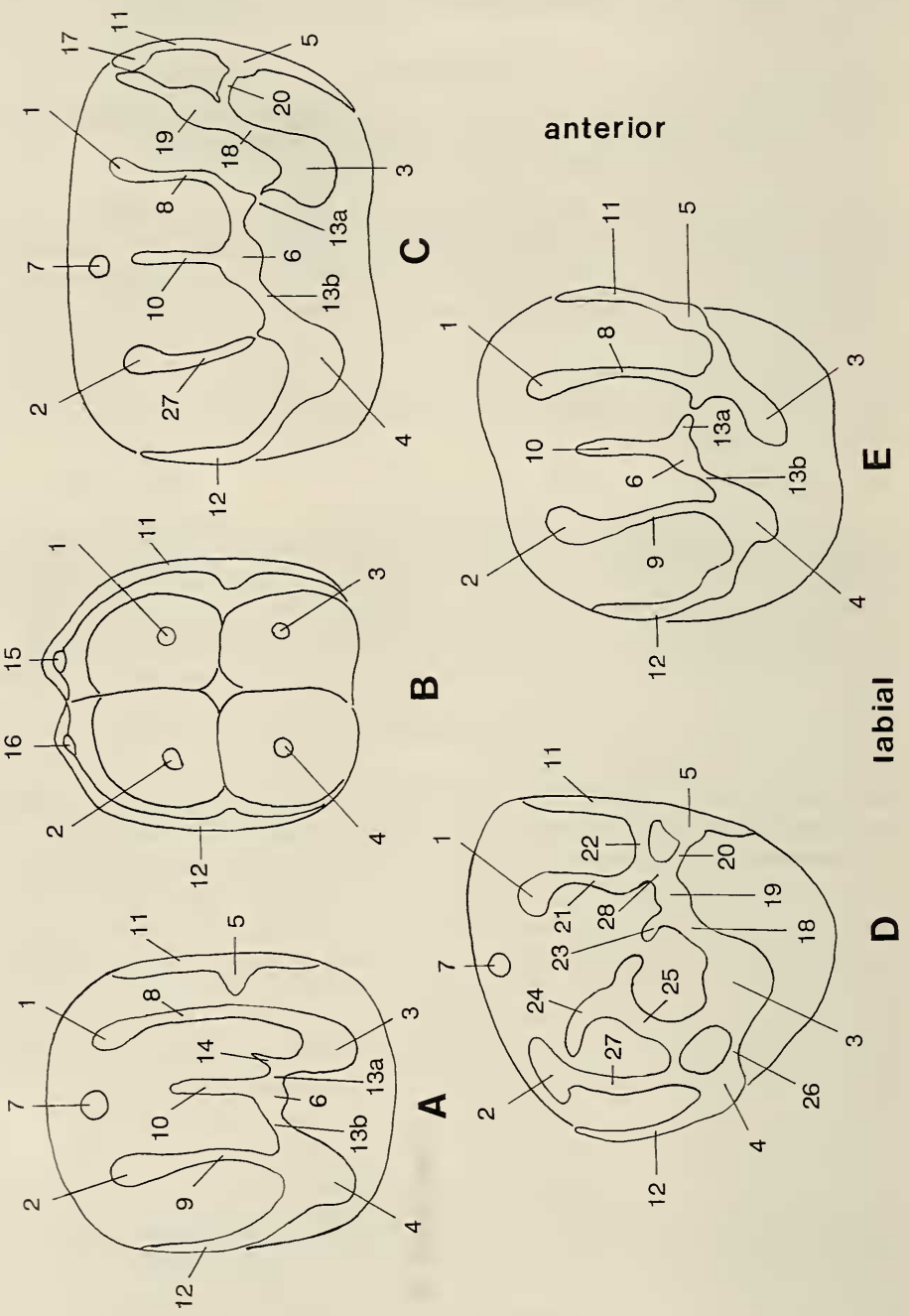
Mason (1988) and Kelly (1990) described the mammalian paleontology and biostratigraphy of the continental Sespe Formation along the northern side of Simi Valley, Ventura County, California. Kelly (1990) recognized four superposed middle Eocene local faunas from the middle member of the Sespe Formation. In ascending stratigraphic order, these faunas include the Tapo Canyon Local Fauna (early late Uintan age), the Brea Canyon Local Fauna (late Uintan age), the Strathern Local Fauna (latest Uintan or earliest Duchesnean age), and the Pearson Ranch Local Fauna (early Duchesnean age).

Kelly and others (1991) reported the preliminary results of a paleontologic resource impact mitigation program that is being conducted in the lower and middle members of the Sespe Formation at the Simi Valley Landfill. They recognized a fifth local fauna, the Simi Valley Landfill Local Fauna of middle or late Duchesnean age, from the uppermost part of the middle member and an unnamed assemblage from the uppermost part of the lower member. The program has yielded many new taxa and geologic and geographic records from the Sespe Formation that were only briefly discussed by Kelly and others (1991). These new taxa are biostratigraphically significant, especially those of the Simi Valley Landfill Local Fauna. This report describes the rodents of the families Eomyidae, Heliscomyidae, Simimyidae, and ?Zapodidae discovered during the program.

Materials and Methods

The specimens described herein were recovered from the middle member of the Sespe Formation by a process described by Kelly and others (1991) that included wet screening of bulk matrix samples and heavy liquid separation of fossils. All specimens have been deposited in the Natural History Museum of Los Angeles County.

All measurements were made with an AO optical micrometer to the nearest 0.01 mm, and all teeth were measured at their greatest dimensions. Measurements


anterior
labial
A
B
C
D
E

of the first two upper molars for some species were grouped, as were those for the first two lower molars because of the difficulty in unequivocally assigning isolated teeth to their correct positions in the dental arcade. All metric abbreviations and dental formulae follow standard usage. Dental terminology used herein is presented in Figs. 1 and 2.

Institutional acronyms are as follows: LACM, Natural History Museum of Los Angeles County; SBCM, San Bernardino County Museum. Abbreviations for anatomical terms are as follows: A-P, anteroposterior; Ant, anterior; L, left; Post, posterior; R, right; TR, transverse. Other abbreviations are as follows: CV, coefficient of variation; Loc., locality; N, number of specimens; OR, observed range; SD, standard deviation.

Systematic Paleontology

Class Mammalia Linnaeus, 1758

Order Rodential Bowdich, 1821

Family Eomyidae Deperet and Douxami, 1902

"*Namatomys*" sp., cf. "*N.*" *fantasma* Lindsay, 1968

Figure 3, Table 1

Specimens.—RM^{1or2}, LACM 130792; RM^{1or2}, LACM 130793; RM^{1or2}, LACM 130795; RM^{1or2}, LACM 134684; RM^{1or2}, LACM 130800; LM^{1or2}, LACM 130797; LM^{1or2}, 130791; LM^{1or2}, LACM 130798; LM^{1or2}, LACM 130799; RP_4, LACM 130808; RM_{1or2}, LACM 130804; LM_1?, LACM 130807; LM_{1or2}, LACM 130805; RM_3, LACM 130803; LM_3, LACM 130806.

Distribution and age.—LACM Locs. 5857 and 5859, Tapo Canyon Local Fauna, early late Uintan; LACM Loc. 5869, Brea Canyon Local Fauna, late Uintan.

Description.—The occlusal surfaces of the upper molars are subquadrate in shape. The anterior cingulum (=anteroloph) is well-developed and extends from the labial aspect of the tooth to the lingual aspect. A distinct anterocone is connected by a small accessory crest to the protoloph near the protocone. The paracone, protocone, metacone, and hypocone are distinct low-crowned cusps with protolophs and metalophs usually forming complete crests that are much lower than the cusps. The posterior arm of the protocone is usually developed labially as a distinct crest and it is commonly forked by additional small spurs. A small mure is present that projects anterolabially from the hypocone towards the posterior arm of the protoloph, but rarely connects with this arm. In five molars, the mesostyle is present as a small distinct cusp. A small spur on the mesocone is commonly present and extends lingually. The posterior cingulum (=posteroloph) is a well-developed, robust crest that extends from the posterolabial base of the metacone to the apex of the hypocone.

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Fig. 1. Dental terminology in upper cheek teeth of A-"*Namatomys*" and *Paradjidaumo*, B-*Heliscomys*, C-*Simimys* M^{1-2}, D-*Simimys* M^3, and E-*Simiacritomys*: 1, paracone; 2, metacone; 3, protocone; 4, hypocone; 5, anterocone; 6, mesocone; 7, mesostyle; 8, protoloph; 9, metaloph; 10, mesoloph; 11, anterior cingulum; 12, posterior cingulum; 13, mure (=entoloph in *Simiacritomys*), a—anterior, b—posterior; 14, posterior arm of protocone; 15, hypostyle; 16, protostyle; 17, parastyle; 18, preprotocrista; 19, protoconule; 20, anteroconal spur; 21, paralophule; 22, cingular-preprotoconular connection; 23, postprotoconular wing; 24, anterior metalophular spur; 25, postprotocrista; 26, postprotoconular crest; 27, metalophule; 28, preprotoconular wing.

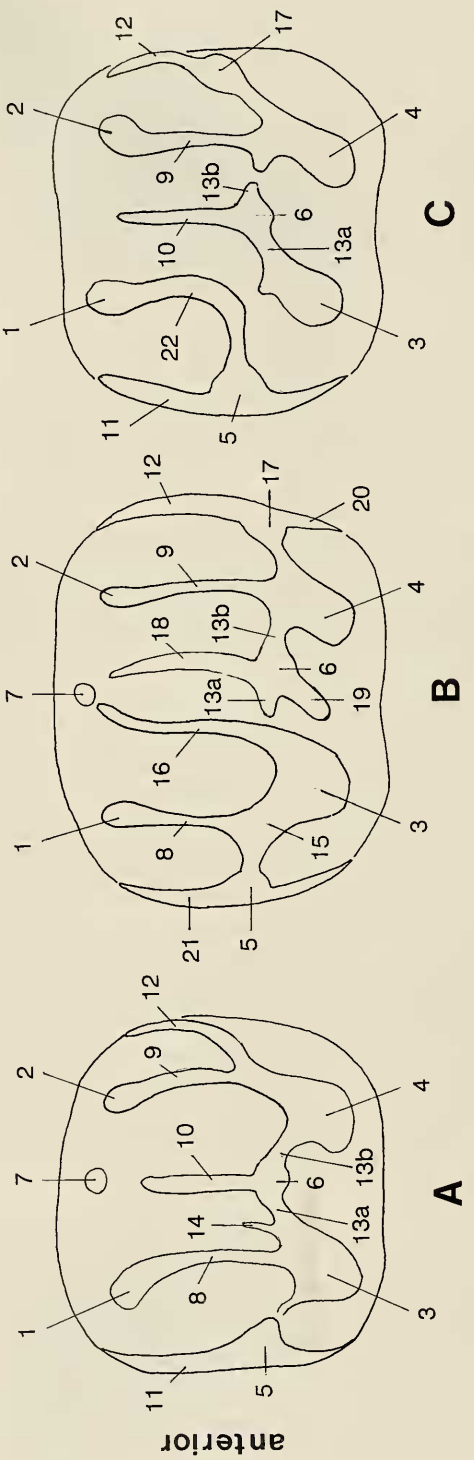

Fig. 2. Dental terminology in lower cheek teeth of A-"*Namatomys*" and *Paradjidaumo*, B-*Simimys*, and C-*Simiacritomys*: 1, metaconid; 2, entoconid; 3, protoconid; 4, hypoconid; 5, anteroconid; 6, mesoconid; 7, mesostylid; 8, metalophid; 9, hypolophid; 10, mesolophid; 11, anterior cingulid; 12, posterior cingulid; 13, mure (=ectolophid in *Simimys* and *Simiacritomys*), a—anterior, b—posterior; 14, posterior arm of protoconid; 15, preprotocristid; 16, postprotocristid; 17, hypoconulid; 18, lingual mesolophid; 19, labial mesolophid; 20, labial extension of posterior cingulid; 21, anterolabial cingulid; 22, labial projection of metaconid.

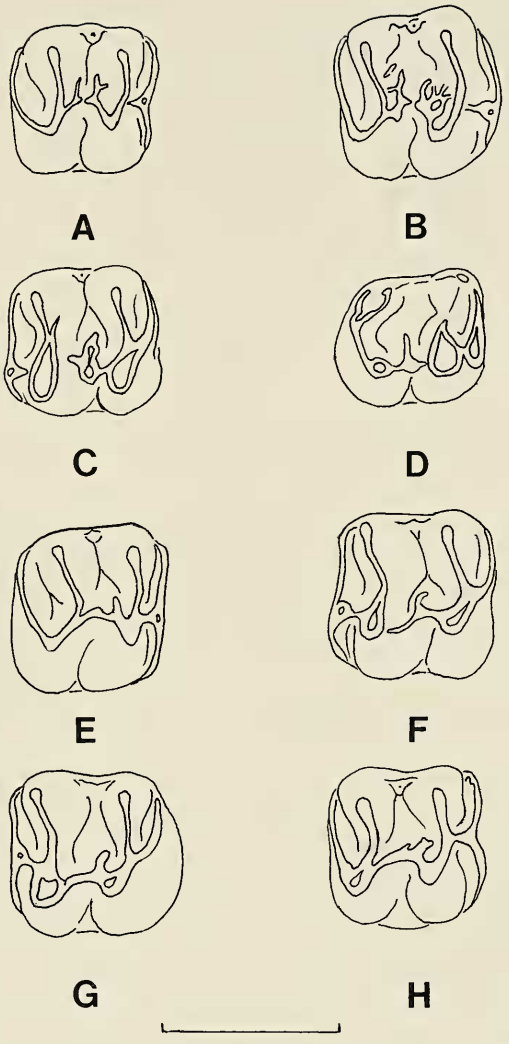

Fig. 3. "*Namatomys*" sp., cf. "*N.*" *fantasma* Lindsay (A–D) and "*Namatomys*" sp. (E–H). "*Namatomys*" sp., cf. "*N.*" *fantasma*. A, RM^{1or2}, LACM 130793. B, RM^{1or2}, LACM 130792. C, LM_{1or2}, LACM 130805. D, LM_3, LACM 130806. "*Namatomys*" sp. E, RM^{1or2}, LACM 131044. F, LM_1?, LACM 131057. G, LM_{1or2}, LACM 131058. H, RP^4, LACM 131040. All occlusal views; D reversed. Scale = 1 mm.

The P_4 is transversely narrowed and anteroposteriorly elongated. A distinct anteroconid is present. The metaconid and protoconid are positioned close together near the anterior midline of the tooth and are connected by a small complete metalophid. The posterior arm of the protoconid is a low, moderately developed crest that extends posterolabially into the central basin of the tooth. The entoconid and hypoconid are distinct cusps connected by a thin hypolophid (=entolophid). A small posterior cingulid is present that extends from the entoconid to the middle of the tooth, where it connects to the hypolophid. A thin crest is present that connects the metaconid with the entoconid.

Table 1. Measurements (in mm) for teeth of "*Namatomys*" sp., cf. *N. fantasma* Lindsay from Tapo Canyon and Brea Canyon Local Faunas.

N	Tooth	Dimension	OR	Mean	S.D.	CV
9	$M^{1 \text{ or } 2}$	A-P	.85–1.05	.98	.08	8.3
9		ANT-TR	.97–1.15	1.05	.07	6.9
9		POST-TR	.97–1.06	1.02	.04	3.4
1	P_4	A-P	.98			
1		ANT-TR	.77			
1		POST-TR	.50			
3	$M_{1 \text{ or } 2}$	A-P	1.02–1.08	1.05		
3		ANT-TR	.91–.95	.94		
		POST-TR	.86–1.00	.94		
2	M_3	A-P	1.04–1.15	1.10		
2		ANT-TR	.90–.97	.94		
2		POST-TR	.90–.93	.92		

The first two lower molars are slightly elongated anteroposteriorly and their occlusal outlines are subrectangular in shape. The anterior cingulid is a robust crest with a distinct anteroconid that is connected to the labial aspect of the metalophid by a small accessory crest. The metaconid, protoconid, entoconid, and hypoconid are distinct cusps. The metalophid and hypolophid are usually complete crests, especially in well worn teeth, and are much lower than the primary cusps. The mure is incomplete anteriorly. A short bifurcated mesolophid is present that extends from the mesoconid into the central basin of the tooth. The mesoconid is connected to the hypoconid by a posterior mure. A small mesostylid is usually present. The posterior cingulid is a well-developed crest extending from the entoconid to the midline of the tooth, where it connects with the hypolophid.

The M_3 is anteroposteriorly elongated and slightly narrower in width posteriorly. The anterior cingulid is a well-developed crest with a small anteroconid that is represented by a bulge at the middle of this crest. In unworn teeth, a small valley separates the anterior cingulid from the protoconid at the anterolabial aspect of the tooth. The metaconid is a sharp cusp that is taller than the moderately well-developed protoconid. The hypoconid is smaller and shorter than the metaconid and protoconid. The entoconid is the smallest of the primary cusps and is positioned towards the posterolingual corner of the tooth, along a crest that connects to the metaconid. The metalophid is a low crest that connects the metaconid with the protoconid. The mesolophid is a moderately distinct crest that extends lingually into the central basin of the tooth. The hypolophid is a thick crest that curves posteriorly from the hypoconid to the entoconid. A small low posterior cingulid is present in one M_3 at the posterolingual aspect of the tooth.

Discussion.—Lindsay (1968) described a new species of eomyid rodent, *Namatomys fantasma* of the Hartman Ranch Local Fauna from the Sespe Formation exposed along upper Sespe Creek, north of Simi Valley. Other investigators (Chiment 1977; Storer 1984, 1987; Korth 1989) concluded that this new species represented a different genus and should not be assigned to *Namatomys* Black (1965). Chiment (1977), in an unpublished Master's thesis, proposed a new generic name, which he and W. W. Korth will publish in a forthcoming report (pers. comm.). Presently all investigators recognize this genus as "*Namatomys.*"

Table 2. Measurements (in mm) for teeth of "*Namatomys*" sp. from Simi Valley Landfill Local Fauna.

N	Tooth	Dimension	OR	Mean	S.D.	CV
4	P^4	A-P	1.04–1.15	1.08		
4		ANT-TR	1.05–1.16	1.10		
4		POST-TR	1.06–1.14	1.08		
6	$M^{1\text{ or }2}$	A-P	1.03–1.13	1.08	.04	3.4
4		ANT-TR	1.17–1.28	1.23		
4		POST-TR	1.10–1.15	1.13		
6	$M_{1\text{ or }2}$	A-P	1.07–1.20	1.14	.05	4.8
6		ANT-TR	1.05–1.18	1.09	.07	6.3
6		POST-TR	1.06–1.19	1.12	.04	4.0

"*Namatomys*" sp., cf. "*N.*" *fantasma* is morphologically very similar to "*Namatomys*" *fantasma,* but differs in having much smaller teeth. It differs from "*N.*" *fugitivus* Storer (1984) of the Swift Current Creek Local Fauna from the Cypress Hills Formation in Saskatchewan by having the following characters: smaller teeth; posterior protoloph-paracone connection in the upper molars less common; and the mesolophid is not strongly forked. It is similar in size to "*N.*" *lacus* Storer (1987) of the LacPelletier Lower Fauna from the Cypress Hills Formation in Saskatchewan, but differs from this species by having the following characters: the connection of the anterocone with the protoloph in the upper molars slightly more labially positioned, resulting in a longer lingual extension of the anterior cingulum from the anterocone; the mure in the upper molars is much less complete; and the ectolophids of the M_1 and the M_2 are more complete. It differs from "*N.*" sp. (see below) from LACM Loc. 5876, which occurs stratigraphically much higher in the section at the Simi Valley Landfill, by having the following characters: smaller teeth with lower crown height; the crests (lophs) are lower and less prominent; the posterior arm of the protocone is commonly bifurcated; and the mesoloph is slightly more complex with additional small spurs present. It is similar in size to an unnamed species of "*Namatomys*" described by Chiment (1977) from the Santiago Formation in the San Diego area of California.

The "*Namatomys*" material from the Tapo Canyon and Brea Canyon Local Faunas appears to represent a new species most closely related to "*Namatomys*" *fantasma.* However, until Chiment and Korth publish a formal description of the unnamed species from the San Diego area and comparisons with that species can be made, the Simi Valley species is herein assigned to "*N.*" sp., cf. "*N.*" *fantasma.*

"*Namatomys*" sp.
Figure 3, Table 2

Specimens.—RP^4, LACM 131040; RP^4, LACM 132438; LP^4, LACM 131451; LP^4, LACM 132448; RM^{1or2}, LACM 131032; RM^{1or2}, LACM 131044; RM^{1or2}, LACM 130849; RM^{1or2}, LACM 131033; LM^{1or2}, LACM 131055; partial RM^{1or2}, LACM 132653; RM_1?, LACM 131045; RM^{1or2}, LACM 131046; RM_{1or2}, LACM 131060; LM_{1or2}, LACM 131057; LM_{1or2}, LACM 131058; LM_{1or2}, LACM 131059.

Distribution and age.—LACM Loc. 5876, Simi Valley Landfill Local Fauna, late Duchesnean.

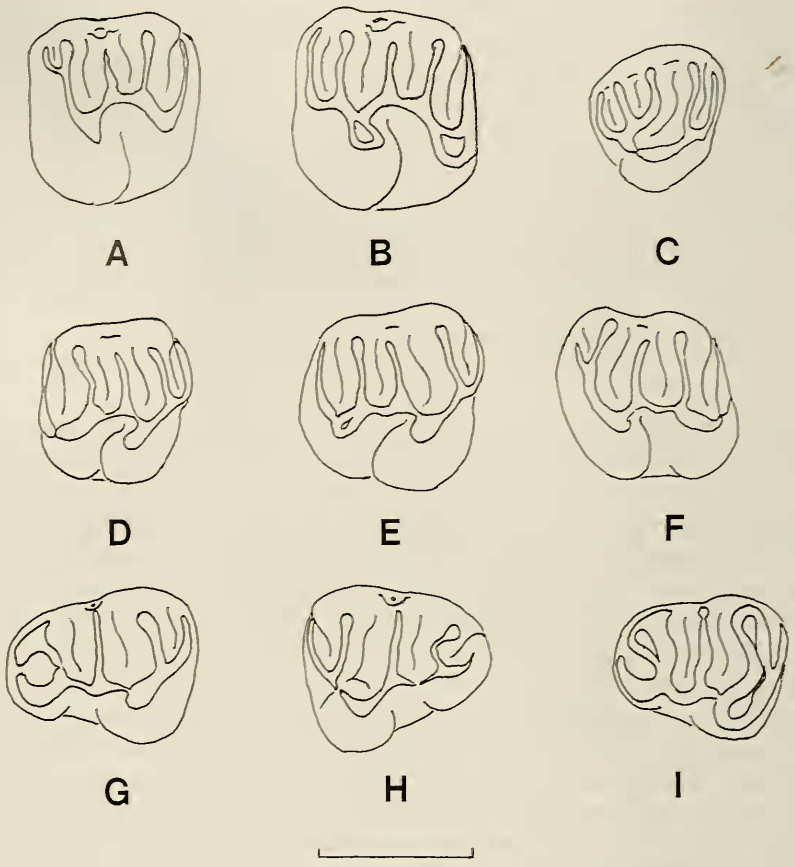

Fig. 4. *Paradjidaumo reynoldsi* new species. A, LP^4, LACM 131036. B, LM^{1or2}, LACM 131078. C, RM^3, LACM 131449. D, LM_{1or2}, LACM 130846. E, LM_{1or2}, LACM 131048. F, LM_3?, LACM 131028. G, RP_4, LACM 131052. H. Holotype, RP_4, LACM 131042. I, LP_4, LACM 131064. All occlusal views; A, B, C, and F reversed. Scale = 1 mm.

Description.—The occlusal outline of the P^4 is almost square. The anterior cingulum is robust with a small crest connecting it to the middle of the protoloph. The protoloph is a complete crest and usually well connected to the paracone. In one tooth, the protoloph is only weakly attached to the paracone. The metaloph is a complete crest connecting the metacone with the hypocone. The protoloph and the metaloph are much lower than the primary cusps. The paracone, protocone, metacone, and hypocone are tall slender cusps that have increased crown height. This increase in crown height is the result of an increase in cusp height alone, whereas the base of the crown remains low. The mure is complete, connecting the mesocone with the protocone and the hypocone. The posterior arm of the protocone is a distinct crest that connects to the posterolabial base of the paracone. The mesoloph varies from a very small spur to a moderately developed, thin, short crest. A distinct mesostyle is present. The posterior cingulum is a robust crest extending from the metacone to the hypocone.

The first and second upper molars are similar in morphology to the P^4, but exhibit the following differences. They are more transversely expanded. The an-

terocone is slightly more robust and positioned further labially. The protoloph and metaloph are complete low crests that are slightly more developed. The mesoloph is usually absent, but, when present, is a very small short spur. The posterior arm of the protocone is usually not present, but, when present, it is a very short crest extending labially, but not joining the paracone. The mesostyle is present as a smaller cusp.

The lower molars are represented by the M_1 and M_2 and exhibit the following characters. The anterior cingulid is well-developed and connected to the protoconid. The metaconid, protoconid, entoconid, and hypoconid are distinct tall slender cusps. The protolophid and metalophid are complete and lower in height than the primary cusps. The mure is usually a complete crest connecting the mesoconid with the protoconid and the hypoconid. The protoconid of one tooth, presumably M_1, has a well-developed posterior arm that extends to and connects with the posterolabial aspect of the metaconid. Apparently the posterior arm of the protoconid is not present in the M_2. The mesolophid is a simple, thick crest that projects a short distance labially from the mesoconid and then turns posteriorly towards the metalophid. The mesostylid is absent or sometimes present as an incipient cusp on the crest between the metaconid and entoconid. The posterior cingulid forms a thick crest that extends labially from the posterolingual corner of the entoconid to the midline of the tooth, where it connects with the metalophid.

Discussion.—"*Namatomys*" sp. of the Simi Valley Landfill Local Fauna differs from "*N.*" sp., "*N.*" *fantasma* of the Tapo Canyon and Brea Canyon Local Faunas by having larger teeth, increased height of the primary cusps, greater development of the crests, and a simpler mesoloph. The increase in crown height and the more prominent crests indicate that "*N.*" sp. is more derived than "*N.*" sp., cf. "*N.*" *fantasma*. The material of "*Namatomys*" from LACM Loc. 5876 probably represents a new species, but until a better sample is available from the Sespe Formation and this sample can be adequately compared with the samples of "*Namatomys*" from the greater San Diego area to be described by Chiment and Korth, it is herein assigned to an unnamed species of "*Namatomys.*"

Paradjidaumo Burke, 1934
Paradjidaumo reynoldsi new species
Figure 4, Table 3

Paradjidaumo n. sp. Kelly and others, 1991:7, 12.

Holotype.—RP_4, LACM 131042.

Type locality.—LACM Loc. 5876.

Diagnosis.—Differs from *Paradjidaumo trilophus* (Cope, 1873) (=*P. nasutus* Cope and *P. minor* Douglass), *P. spokanensis* White (1954), *P. hansonorum* Russell (1972), *P. hypsodus* Setoguchi (1978), and *P. validus* Korth (1980) by having smaller teeth (averaging 12%, 22%, 15%, 10%, 29% smaller, respectively). Further differs from *P. trilophus* by having P_4 less molariform and mesolophids with less tendency to join entoconids with wear. Further differs from *P. spokanensis* by having the following characters: P^4 smaller relative to molars; P_4 more anteroposteriorly elongated; and mesolophid of M_2 and M_3 not connected to entoconid. Further differs from *P. alberti* Russell (1954) by having the following characters: P_4 longer, wider posteriorly, and larger relative to molars; P_4 mesoconid connected by mure to hypoconid; and lower molars less elongated anteroposteriorly, resulting

Table 3. Measurements (in mm) for teeth of *Paradjidaumo reynoldsi* new species from Simi Valley Landfill Local Fauna.

N	Tooth	Dimension	OR	Mean	S.D.	CV
5	P^4	A-P	1.10–1.25	1.19	.06	5.4
5		ANT-TR	1.10–1.24	1.18	.07	5.9
5		POST-TR	1.08–1.24	1.16	.06	4.9
11	$M^{1 \text{ or } 2}$	A-P	1.17–1.32	1.25	.06	4.9
10		ANT-TR	1.17–1.47	1.38	.11	7.6
8		POST-TR	1.25–1.45	1.36	.06	4.4
5	M^3	A-P	.95–1.01	.95	.05	5.3
5		TR	.99–1.11	1.05	.05	5.1
5	P_4	A-P	1.16–1.36	1.26	.09	7.3
5		ANT-TR	.83–1.03	.88	.09	9.6
5		POST-TR	1.08–1.30	1.22	.09	7.6
15	$M_{1 \text{ or } 2}$	A-P	1.07–1.37	1.24	.07	5.9
11		ANT-TR	1.00–1.26	1.13	.09	8.0
13		POST-TR	1.07–1.29	1.20	.07	6.0
3	M_3	A-P	1.17–1.35	1.27		
3		ANT-TR	1.10–1.28	1.15		
3		POST-TR	1.16–1.17	1.16		

in squarer occlusal outlines. Further differs from *P. hansonorum* by having P_4 not square in occlusal outline, but with anterior width much smaller relative to posterior width. Further differs from *P. hypsodus* by having the following characters: P_4 wider transversely relative to anteroposterior length; and cheek teeth with lower crowns, valleys between cusps and crests shallower, and cusps more prominent relative to crests. Further differs from *P. validus* by having the following characters: P_4 less molariform; greater development of cingulids in lower molars; and lack of accessory lophid joining mesolophid and hypolophid on P_4 through M_2.

Etymology.—Named in honor of Robert E. Reynolds, Curator of Earth Science, San Bernardino County Museum, in recognition of his extensive work in the recovery of fossil microvertebrates from southern California and his contributions to the Simi Valley Landfill Paleontologic Resource Impact Mitigation Program.

Referred specimens.—RP^4, LACM 131041; RP^4, LACM 131036; LP^4, LACM 131038; LP^4, LACM 131037; LP^4, LACM 131079; RM^{1or2}, LACM 130843; RM^{1or2}, LACM 130844; RM^{1or2}, LACM 130847; RM^{1or2}, LACM 131034; RM^{1or2}, LACM 131035; RM^{1or2}, LACM 131068; RM^{1or2}, LACM 131078; RM^{1or2}, LACM 131031; RM^{1or2}, LACM 131456; RM^{1or2}, LACM 132437; LM^{1or2}, 130842; LM^{1or2}, LACM 130848; LM^{1or2}, LACM 131027; LM^{1or2}, LACM 132444; LM^{1or2}, LACM 132457; RM^3, LACM 130840; RM^3, LACM 131077; RM^3, LACM 131450; LM^3, LACM 131449; LM^3, LACM 131463; RP_4, LACM 131052; RP_4, LACM 132443; RP_4, LACM 132446; LP_4, LACM 131064; LP_4, LACM 131051; LP_4, LACM 131053; LP_4, LACM 132435; RM_{1or2}, LACM 131056; RM_{1or2}, LACM 130845; RM_1, LACM 130850; RM_1, LACM 131039; RM_1, LACM 131049; LM_1, LACM 130846; RM_2, LACM 131043; RM_{1or2}, LACM 130851; RM_{1or2}, LACM 131054; partial RM_{1or2}, LACM 131063; LM_{1or2}, LACM 131048; LM_{1or2}, LACM 131061; LM_{1or2}, LACM 131453; LM_{1or2}, LACM 131454; LM_{1or2}, LACM 131455; LM_3, LACM 130841; LM_3, LACM 131028; LM_3, LACM 131050.

Distribution and age.—LACM Loc. 5876, Simi Valley Landfill Local Fauna, late Duchesnean.

Description.—The occlusal outline of the P^4 is almost square. The anterior cingulum is a low and weakly developed crest that usually connects with the lingual aspect of the protoloph. The anterior cingulum is not a distinct loph on the occlusal surface because of its small size and low height, and gives the tooth a four-crested pattern. The paracone, protocone, metacone, and hypocone are rounded cusps that have increased crown height through an increase in the height of the crown base. The protoloph and metaloph are complete, thick, high crests that connect the paracone with the protocone, and the metacone with the hypocone, respectively. The mesoloph is usually a long, high, well-defined crest extending to the lingual aspect of the tooth. The mure is a complete high crest. The posterior cingulum is a well-developed, high crest that extends from the metacone to the hypocone.

The first two upper molars are similar to the P^4 except for the following differences. They are expanded transversely and have a strong five-crested occlusal pattern. The anterior cingulum is well-developed forming a robust, high crest that extends lingually from anterolabial aspect of the paracone to the midline of the tooth, where it connects with the protoloph. The mesostyle is present as a small cusp in five molars.

The occlusal outline of the M^3 is subtriangular, with the posterior aspect transversely narrowed. The anterior cingulum is a well-developed crest that extends lingually from the anterolabial aspect of the paracone to the midline of the tooth where it connects with the protoloph. The five-crested occlusal pattern is usually well-developed. The paracone is the tallest primary cusp. The protocone is a thick, rounded cusp that is positioned towards he center of the lingual aspect of the tooth. The protocone usually is connected to the hypocone. A small mesostyle is sometimes present. The protoloph and metaloph are complete, thick, high crests. The mesoloph is a high, distinct crest extending to the labial aspect of the tooth. The posterior cingulum is a distinct crest.

The P_4 is transversely narrowed and anteroposteriorly elongated. A small anterior cingulid is present that connects to the protoconid. The protoconid and metaconid are positioned medially and connected posteriorly by a complete metalophid. The hypolophid usually is a complete, high crest that connects the entoconid with the hypoconid, except in one tooth, wherein the hypolophid is divided by a shallow cleft that is labial to the connection of the posterior cingulid and the hypolophid. The mesolophid usually is a long, well-developed crest that extends lingually to a distinct but small mesostylid. The posterior cingulid is a well-developed, thick crest that extends labially from the posterolingual corner of the entoconid to the midline of the tooth, where it connects with the center of the metalophid.

The M_1 and M_2 are slightly anteroposteriorly elongated and their occlusal outlines are subquadrate to subrectangular. The anterior cingulid extends labially from the anterolingual corner of the tooth and connects with the anterolabial corner of the protoconid. The metaconid, protoconid, entoconid, and hypoconid are conical cusps that have increased crown height through an increase in the height of the crown base. The metaconid and entoconid are taller than the protoconid and hypoconid. The metalophid and hypolophid are complete, high crests.

The mure is a high, complete crest connecting the mesoconid with the protoconid and hypoconid. The mesolophid is usually a long, high, well-defined crest that extends to or near the lingual aspect of the tooth. The posterior cingulid is a moderately high crest that extends labially from the posterolingual aspect of the entoconid to the midline of the tooth where it connects with the center of the hypolophid.

Three teeth are questionably considered M_3s. These teeth are similar to the M_1 and M_2, except for the following differences. The hypolophid is a more rounded crest and the posterior cingulid is smaller and lower in height.

Discussion.—Burke (1934) named and described *Paradjidaumo* and documented the unique attachment of the anterior cingulid to the anterolabial aspect of the protoconid in the lower molars of this genus. The teeth described above can be confidently assigned to *Paradjidaumo* because they exhibit the following characters: well-developed crests (=lophs) that are nearly as high as the primary cusps; the mesolophs and mesolophids of the molars are high and complete, and form a five-crested occlusal pattern; and the lower molars possess the unique attachment of the anterior cingulid to the protoconid.

Paradjidaumo is primarily known from faunas of Chadronian to Orellan age. The only previous record of the genus from the Duchesnean was documented by Russell (1954), who described *P. alberti* from the Kishenehn Formation of British Columbia. *Paradjidaumo reynoldsi* can be easily distinguished from *P. alberti* by its relatively larger P_4 that has the mesoconid connected by the mure to the hypoconid and its squarer lower molars. *Paradjidaumo reynoldsi* is restricted to the Simi Valley Landfill Local Fauna and this occurrence represents the first record of the genus from the Sespe Formation and the second record of the genus in the Duchesnean.

Family Heliscomyidae Korth, Wahlert, and Emry, 1991

Heliscomys Cope, 1873

Heliscomys sp.

Figure 5

Specimens.—RM^1, LACM 131452; LM^2, LACM 132456.

Distribution and age.—LACM Loc. 5876, Simi Valley Landfill Local Fauna, late Duchesnean.

Description.—The two upper molars are the only teeth of *Heliscomys* thus far recovered during the impact mitigation program. They are well preserved and only slightly worn. The measurements of LACM 131452 are 0.70 mm A-P, 0.56 mm ANT-TR, and 0.59 mm POST-TR, and those of LACM 132456 are 0.82 mm A-P, 0.73 mm ANT-TR, and 0.81 mm POST-TR. The occlusal outlines of the upper molars are square. Each tooth has six cusps arranged in two rows of three cusps each. The paracone, metacone, protocone, hypocone are well-defined conical cusps. The paracone and the metacone are slightly taller than protocone and hypocone. Moderately deep valleys separate the cusps and the lingual cingulum from the hypocone and protocone. The median transverse valley is open lingually. The hypostyle (=entostyle of Black, 1965) is a distinct cusp on the lingual cingulum, lower than the hypocone, and separated from the protostyle by a small cleft that is an extension of the median transverse valley. The protostyle is weakly expressed as a small incipient cusp on the lingual cingulum. The anterior

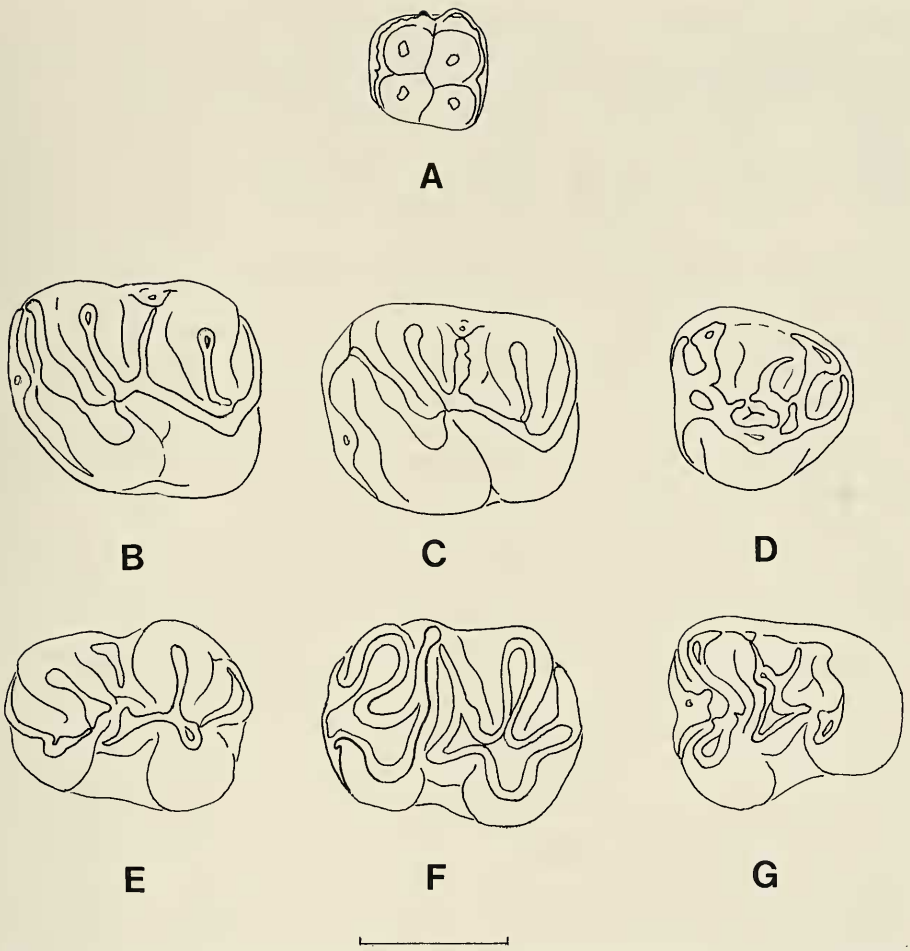

Fig. 5. *Heliscomys* sp. (A) and *Simimys landeri* new species (B–G). *Heliscomys* sp. A, RM^1, LACM 131452. *Simimys landeri*. B, Holotype, RM^1, LACM 131062. C, RM^2, LACM 130759. D, RM^3, LACM 131458. E, RM_1, LACM 130771. F, RM_2, LACM 130765. G, LM_3, LACM 130767. All occlusal views; A–F reversed. Scale = 1 mm.

cingulum is a thin crest separated from the paracone and the protocone by a shallower valley than the median transverse valley, and is continuous with the lingual cingulum. The posterior cingulum is moderately developed with a very small incipient cusp in the center of the cingulum, and it is separated from the metacone and the hypocone by a shallower valley than the median transverse valley.

Discussion.—The upper molars from Simi Valley are assigned to *Heliscomys* because of the presence of six cusps that are positioned in two transverse rows of three cusps each, the square shape of the occlusal surface, and the conical shape of the primary cusps, which are separated by distinct valleys.

The *Heliscomys* teeth from Simi Valley are very similar to those of *H.* sp., cf. *H. vetus* Cope (1873) from the Pipestone Springs Local Fauna (Black 1965) of the Renova Formation in Montana (Chadronian age) and the Pilgrim Creek Local

Fauna (Sutton and Black 1975) of the Jackson Hole area in Wyoming (Chadronian age). It differs from *H.* sp., cf. *H. vetus* and all other species of *Heliscomys* by having the following characters: the M^{1-2} are slightly smaller; the primary cusps are subequal in height; the protostyle and the hypostyle are lower in height than the primary cusps; the posterior cingulum is slightly more developed with an incipient cusp present; the median transverse valley is slightly shallower; the valley between the anterior cingulum and the paracone and the protocone is slightly shallower; and the valley separating the posterior cingulum and the metacone and the hypocone is slightly shallower. Although the sample of *H.* sp. consists of only two teeth, all of the above characters indicate *H.* sp. is less derived than the other species of *Heliscomys,* as would be expected considering its earlier occurrence in the Duchesnean. Storer (1988) described a premolar, which he assigned to *Heliscomys* sp., from the Lac Pelletier Lower Fauna (late Duchesnean age) of Saskatchewan. It is difficult to compare the Simi Valley teeth of *Heliscomys* with that from Saskatchewan because they represent different teeth. The Simi Valley teeth probably represent a new species, but, until a larger sample is available, they are assigned to an unnamed species of *Heliscomys.*

Heliscomys sp. is restricted to the Simi Valley Landfill Local Fauna and this occurrence is the first record of the genus and the family Heliscomyidae from the middle member of the Sespe Formation. Furthermore, the specimens of *H.* sp. from Simi Valley represent in the second record of the genus in the Duchesnean.

Family Simimyidae Wood, 1980
Simimys Wilson, 1935a
Simimys landeri new species
Figure 5, Table 4

Simimys n. sp. Kelly and others, 1991:7, 12.

Holotype.—RM^1, LACM 131062.

Type locality.—LACM Loc. 5876.

Diagnosis.—Differs from other species of *Simimys* by having the following characters: larger (15% to 41% in tooth measurements); cheek teeth with less development of small accessory crests and stylids; M^3 hypocone more prominent; and M_3 lingual metalophid bifurcated at lingual aspect with one end connecting to metastylid and other to base of entoconid.

Etymology.—Named in honor of E. Bruce Lander of Paleo Environmental Associates, Inc. and the Natural History Museum of Los Angeles County, in recognition of his efforts directing the Simi Valley Landfill Paleontologic Resource Impact Mitigation Program that resulted in the recovery of large samples of microvertebrates from the Sespe Formation.

Referred specimens.—RM^1, LACM 130760; RM^1, LACM 130762; RM^1, LACM 130769; LM^1, 130772; LM^2, LACM 130773; RM^2, LACM 130759; RM^2, LACM 130761; RM^2, LACM 134685; RM^3, LACM 131458; LM^3, LACM 131459; LM^3, LACM 132439; LM^3, LACM 130768; LM_1, LACM 131070; RM_1, LACM 130771; RM_1, LACM 132434; partial RM_1, LACM 132454; RM_2, LACM 130765; LM_2, LACM 130766; LM_2, LACM 132453; RM_2, 130763; LM_3, LACM 130767; LM_3, LACM 132450; LM_3, LACM 132455; RM_3, LACM 130770.

Distribution and age.—Type locality, Simi Valley Landfill Local Fauna, late Duchesnean.

Table 4. Measurements (in mm) for teeth of *Simimys landeri* new species from Simi Valley Landfill Local Fauna.

N	Tooth	Dimension	OR	Mean	S.D.	CV
5	M^1	A-P	1.70–1.94	1.81	.11	5.8
5		ANT-TR	1.43–1.58	1.49	.06	4.2
5		POST-TR	1.47–1.66	1.56	.07	4.8
4	M^2	A-P	1.76–1.81	1.79		
4		ANT-TR	1.56–1.64	1.60		
4		POST-TR	1.49–1.58	1.52		
4	M^3	A-P	1.24–1.31	1.28		
4		TR	1.15–1.24	1.21		
3	M_1	A-P	1.76–1.85	1.80		
3		ANT-TR	1.05–1.14	1.10		
4		POST-TR	1.24–1.40	1.32		
4	M_2	A-P	1.75–1.91	1.85		
4		ANT-TR	1.28–1.50	1.40		
4		POST-TR	1.40–1.56	1.46		
4	M_3	A-P	1.52–1.64	1.58		
4		ANT-TR	1.23–1.34	1.29		
4		POST-TR	1.04–1.18	1.13		

Description.—The M^1 is slightly elongated anteroposteriorly and the occlusal outline is subrectangular in shape. The paracone, metacone, protocone, and hypocone are well-developed cusps. The mure is complete and connected to the protocone and the hypocone. The protoloph is a well-developed crest joining the mesocone with the paracone. The mesoloph is a complete crest that extends from the mesocone to the mesostyle. The mesostyle is usually weakly expressed, but in some teeth, it is a small distinct cusp. The metalophule is absent or expressed as a thin crest. The parastyle is represented by a small bulge on the labial aspect of the anterior cingulum. The anterocone is a distinct cusp on lingual aspect of the anterior cingulum. In unworn teeth, the protoconule is a distinct and well-developed cusp that is positioned along the crest between the protocone and paracone. The anteroconal spur is absent to moderately developed. The paralophule, postmesoconal spur, and enterostyle are absent.

The M^2 is anteroposteriorly elongated and the occlusal outline is subrectangular. The anterocone is a small distinct cusp. An anteroconal spur is absent to well-developed. The parastyle is a moderately to well-developed cusp. In unworn teeth, a cleft is present that separates the parastyle and the anterior cingulum, except near the base of the crown. The protoconule is a distinct cusp. The protoloph is a distinct crest that joins the mesocone with the paracone. The mesoloph is a distinct crest that extends lingually to the mesostyle. The metalophule usually is well-developed. A small accessory cusp sometimes is present on the mesoloph near the mesostyle. The anterior and posterior cingulae are robust. The paralophule, postmesoconule spur, and enterostyle are absent.

The M^3 has a subtriangular occlusal outline. The protocone is a well-developed cusp. The metacone is a moderately well-developed cusp. The hypocone is posteriorly positioned and moderately developed as a distinct expansion on the posterolingual aspect of the tooth. The protoconule is small. The paralophule is well-developed. The metalophule is a well-developed thick crest in moderately

worn teeth. The mesostyle is weakly developed. The cingular-preprotoconular connection is strongly developed. The anterocone is a distinct cusp with a complete anteroconal spur that connects the anterocone with the preprotocrista. A small postprotoconular wing extends posteriorly a short distance towards the postprotocrista. The postprotocrista extends anterolingually into the central basin of tooth and a small anterolabial bifurcation is present about half-way along the postprotocrista that is directed towards, but does not connect with, the postprotoconular wing. The anterior metalophular spur connects the metalophule with the postprotocrista. Small depressions are present in the enamel of the central basin of the tooth.

The M_1 is anteroposteriorly elongated and the occlusal outline is subrectangular in shape. The anteroconid (=preprotoconid of Lillegraven and Wilson 1975) is usually weakly developed, but in one tooth it is a distinct cusp. A preprotocristid is present that connects the protoconid with the anteroconid. The protoconid is connected to the metaconid by the postprotocristid. A small cusp-like swelling is present in the center of the postprotocristid. The entoconid and the hypoconulid are well-developed cusps. The mesoconid is robust with short, but distinct, labial and lingual mesolophids present. The hypolophid is a well-developed crest that connects the entoconid with the hypoconid. The mesostylid is well-developed and a labial extension of mesostylid is present. The posterior ectolophid connects the hypoconid with the mesoconid. The posterior cingulid is a well-developed crest that extends from the posterolingual aspect of the entoconid to the hypoconid. There is no labial extension of the posterior cingulid.

The M_2 is anteroposteriorly elongated and the occlusal outline is subrectangular. The protoconid, metaconid, entoconid, and hypoconid are well-developed cusps. The mesoconid is large and robust. The hypoconulid is well-developed and attached to the prominent posterior cingulid. The lingual mesolophid is robust and extends to base of the mesostylid. The labial mesolophid is developed as a rounded projection extending from the mesoconid. The postprotocristid is a single crest with no bifurcation and joins the mesostylid with wear. The metalophid is a complete crest extending between the preprotocristid and the metaconid. A distinct anterolabial cingulid is present. The premetastylid is absent.

The M_3 is anteroposteriorly elongated, posteriorly narrowed, and the occlusal outline is subrectangular. The protoconid, metaconid, entoconid, and hypoconid are well-developed cusps. The labial mesolophid is short and does not extend below the hypoconid. In some teeth, a very small cross-crest is sometimes present on the labial mesolophid. The lingual metalophid is bifurcated at its lingual end, with one spur of the bifurcation connecting to the mesostyid and the other spur to the base of the entoconid. The ectostylid is absent.

Discussion.—Wilson (1935a) described two rodents from the Sespe Formation as *Eusmysops simplex* and *E. vetus*. Wilson (1935b) then amended the generic name to *Simimys* for these two species. Wilson (1949) named a third species, *S. murinus*, from the Sespe Formation and described additional material, including a partial skull. Lillegraven and Wilson (1975) and Walsh (1987) proposed synonymizing *S. vetus* and *S. murinus* with *S. simplex*. The impact mitigation program at the Simi Valley Landfill has yielded many large superposed samples of *S. simplex*, and analysis of these samples will be described in a separate paper. *Simimys landeri* can be easily distinguished from *S. simplex* by its much larger

teeth. The observed ranges of all tooth measurements for *S. landeri* do not overlap those for *S. simplex*. Furthermore, most of the tooth measurements for *S. landeri* are five or more standard deviations away from the means of the respective tooth measurements for *S. simplex*. The teeth of *S. landeri* also appear to be less complex than those of *S. simplex*, with a reduction in the number of small crests and stylids. *Simimys landeri* further differs from *S. simplex* by having a better developed M^3 hypocone and a bifurcated M_3 metalophid that connects lingually to the metastylid and entoconid. *Simimys landeri* is only known from the Simi Valley Landfill Local Fauna (late Duchesnean age) at LACM Loc. 5876, whereas *S. simplex* is known from the Tapo Canyon, Brea Canyon, Strathern, Pearson Ranch, and Simi Valley Landfill Local Faunas (late Uintan to late Duchesnean).

Lillegraven and Wilson (1975) analyzed a large sample of *S. simplex* from the Camp San Onofre Local Fauna of the Santiago Formation in the Oceanside area, California, and found that almost all dental characters studied were highly variable and unreliable for separating species of *Simimys*. They found this to be particularly true for the following characters: the amount of metaconid development in the lower molars; the development of mesostylids in the lower molars; the presence of a mesolophid connection to the protoconid; the anterior ectolophid connection to the protoconid; and the morphology of M^3 and M_3. The characters used herein to separate *S. simplex* from *S. landeri* were not discussed by Lillegraven and Wilson (1975) and presumably are diagnostic. However, even if future study indicates some of these characters are taxonomically unreliable for species diagnosis, the much larger size of *S. landeri* still warrants specific separation from *S. simplex*.

The ambiguous nature of the morphological characters in *Simimys* has resulted in different familial assignments. Klingener (1964) and Lindsay (1968) suggested *Simimys* exhibited muroid characters and may belong to the Cricetidae, whereas Wood (1937), Stehlin and Schaub (1951), Klingener (1963), and Lillegraven and Wilson (1975) questionably assigned *Simimys* to the Zapodidae. Wood (1974, 1980) considered *Simimys* to be too derived to be ancestral to later zapodids and assigned *Simimys* to the superfamily Dipodoidea, family Simimyidae, whereas Emry (1981) referred *Simimys* to the superfamily Muroidea, family *incertae sedis*. Emry and Korth (1989) considered the loss of the P^4 in *Simimys* to possibly warrant its assignment to a separate family closely related to the Zapodidae and under the Dipodoidea. Wood (1980) presented the most convincing evidence that *Simimys* represents a distinct family of the Dipodoidea and this systematic assignment is followed here.

Family ? Zapodidae Coues, 1875
Simiacritomys new genus

Type species.—*Simiacritomys whistleri* new species.

Range.—Late Eocene (late Duchesnean) of southern California.

Diagnosis.—Molars five-lophed with robust, rounded cusps; deep median transverse valley that divides tooth into anterior and posterior sections usually present in first two upper and lower molars; anterocone well-developed; M^1 and M^2 protoloph usually divided, midway along its length, by cleft; M_1 and M_2 metalophid divided, midway along its length, by deep valley separating metaconid and protoconid; hypolophid thick, prominent crest connecting hypoconid and ento-

conid: mesoloph and mesolophid usually long, high, well-developed crests strongly connected to mesocone and mesoconid, respectively; anterior entoloph small anteriorly directed crest not connecting with protoloph; posterior entoloph thick, high, well-developed crest connecting hypocone with mesocone; ectolophids incomplete; distinct hypoconulid present; and cheek tooth enamel thick.

Referred species.—Type species only.

Etymology.—*Simi,* in reference to its occurrence in Simi Valley; *acritos,* Greek for mixed or confused; *mys,* Greek for mouse.

Discussion.—The familial relations of *Simiacritomys* are uncertain. The teeth of *Simiacritomys* exhibit similarities to those of eomyid and zapodid rodents. The molars are similar to eomyids by having a five-crested occlusal pattern with a similar positioning of the crests and cusps. However, they differ from all eomyid genera by having the following characters: the first two upper and lower molars are divided into anterior and posterior portions by deep transverse valleys; the protoloph usually divided, midway along its length, by a cleft that separates the paracone from the protocone; and the metalophid is divided or not developed because of a deep valley between the metaconid and the protoconid. The cheek teeth of *Simiacritomys* are similar to those of the zapodids *Plesiosminthus* Viret (1926) and *Megasminthus* Klingener (1966) by having a five-crested occlusal pattern, the mesoloph and the mesolophid usually long and well-developed, and the presence of a hypoconulid on the lower molars. In particular, the upper molars of *Plesiosminthus grangeri* (Wood, 1935) figured by Green (1977, p. 1001, Figs. 3E, 3G) are strikingly similar to those of *Simiacritomys,* especially with regard to the presence of deep transverse valleys that separate these teeth into anterior and posterior portions. *Plesiosminthus* differs from *Simiacritomys* by having complete protolophs and metalophids, more complete entolophs and ectolophids, and more anteroposteriorly elongated lower molars. *Megasminthus* differs from *Simiacritomys* by having cheek teeth with mesostyles and mesostylids, less anteriorly directed metalophs, less isolated metaconids, and more complete ectolophids.

The molar occlusal patterns of *Simiacritomys* exhibit some similarities to those of the Bridgerian ?zapodid *Elymys* Emry and Korth (1989) and to those of the simimyid *Simimys.* The molars of *Simiacritomys* differ from those of *Elymys* by having squarer occlusal outlines, mesolophs and mesolophids, and incomplete protolophs, metalophids, entolophs and ectolophids. The teeth of *Simiacritomys* differ from those of *Simimys* by having molars with more quadrate (less anteroposteriorly elongated) occlusal outlines, a central transverse valley dividing the molars into anterior and posterior portions, upper molars with transversely oriented (less oblique) crests and lacking the W-shaped occlusal pattern, the anterior cingulum in the upper molars does not project lingually from the anterocone, no protoconules or mesostyles, and a valley present that separates the metaconid from the protoconid.

Storer (1988, p. 98, Fig. 4) described and figured an upper molar of an undetermined genus and species of rodent from the Lac Pelletier Lower Fauna of Saskatchewan (late Duchesnean age). This tooth is similar to those of *Simiacritomys* in having a five-crested occlusal pattern, a transverse valley dividing the tooth, the anterior cingulum connected with the protocone and extending to the anterolingual corner of the tooth, and the hypocone strongly connected to the mesoloph. The upper molars of *Simiacritomys* differ from this tooth by having

a divided protoloph, a complete well-developed metaloph, and no mesostyle. Storer (1988) noted the similarity of the tooth from Saskatchewan with those of *Plesiosminthus* and with an upper molar described by Dawson (1966, p. 113) from Duchesne River Formation in the Uinta Basin of Utah (Randlett Fauna, Uintan age). Dawson (1966) assigned the tooth from Utah to "?sciuravid or myomorph sp." and noted some similarities between this tooth and those of *Sciuravus* Marsh (1871) and *Simimys*. The teeth of *Simiacritomys* are similar to this tooth by having the protocone and the hypocone separated by a distinct valley, a long mesoloph, an incomplete entoloph that projects anteriorly from the mesocone but does not connect with the protoloph, a central transverse valley dividing the tooth into anterior and posterior portions, and a similar arrangement of the posterior cingulum, which extends from the posterolabial corner of the tooth to the hypocone. The teeth of *Simiacritomys* differ from this tooth by having no lingual projection of the anterior cingulum, an anterior cingulum that is connected with the protoloph near midline rather than labially, and no mesostyle. The indeterminate rodent teeth described by Storer (1988) and Dawson (1966) appear to represent taxa that are related to *Simiacritomys*. However, their generic assignments will remain uncertain until larger samples of these taxa are available.

The teeth of *Simiacritomys* are morphologically most similar to those of the sicistine zapodid *Plesiosminthus*. This similarity suggests *Simiacritomys* is a member of the family Zapodidae. Definitive familial assignment of *Simiacritomys* requires knowledge of the morphology of the skull and the mandible, which are presently unknown.

Simiacritomys whistleri new species
Figure 6, Table 5

?zapodid, new genus and species Kelly and others, 1991:6, 13.

Holotype.—LM_2, LACM 131462.

Type locality.—LACM 5876.

Diagnosis.—Same as for genus.

Referred specimens.—RM^{1or2}, LACM 130854; partial RM^{1or2}, LACM 130852; RM^{1or2}, LACM 130853; LM^{1or2}, LACM 130855; LM^3, LACM 131075; LM^3, LACM 131457; LM^3, LACM 132451; RM_2, LACM 130857; RM_2, LACM 131461; LM_2, LACM 131065; LM_2, LACM 130856; LM_2, LACM 130858; LM_2, LACM 130861; RM_3, LACM 131460; LM_3, LACM 130860; LM_3, LACM 131069.

Etymology.—Named in honor of David P. Whistler of the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County for his work on the Paleontologic Resource Impact Mitigation Program on the Sespe Formation at the Simi Valley Landfill.

Description.—The first two upper molars exhibit the following characters. The occlusal outline is subquadrate. The teeth have a five-crested or lophed occlusal pattern. The anterior cingulum is a thick, well-developed crest that extends from the anterolabial base of the paracone to the protoloph, and has no lingual extension. The anterocone is usually represented by a small distinct cusp along the anterior cingulum near its connection with the protocone. The paracone, metacone, protocone, and hypocone are well-developed conical cusps. A central transverse valley completely divides the tooth into anterior and posterior portions,

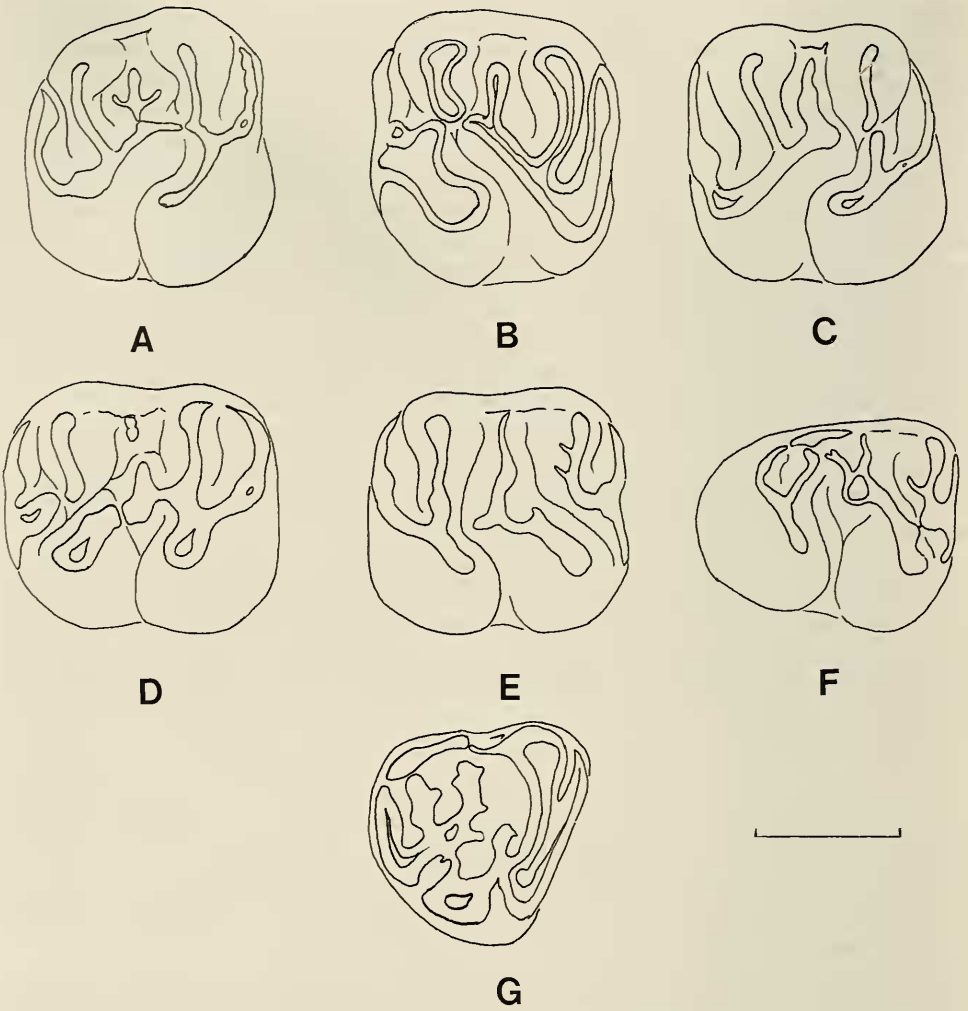

Fig. 6. *Simiacritomys whistleri* new genus and species. A, RM^{1or2}, LACM 130854. B, RM^{1or2}, LACM 130853. C, LM^{1or2}, LACM 130855. D, RM_2, LACM 130857. E, Holotype, RM_2, LACM 131462. F, RM_3, LACM 130460. G, LM^3, LACM 131075. All occlusal views; D reversed. Scale = 1 mm.

and is open labially and lingually. The other valleys between the primary cusps and crests are deep. The protoloph is usually divided, midway along its length, by an obliquely directed valley that persists even in extreme wear. In one tooth (LACM 130854), the protoloph is a complete crest across this valley and connects the protocone with the metacone. A mesostyle is not present. The metaloph is a thick, well-developed crest connecting the metacone and hypocone. The mesoloph is a moderately long, thick, high crest. In one tooth (LACM 130854), the mesoloph has two accessory spurs, one directed anterolabially, the other, posterolabially. The posterior entoloph (=posterior mure) is a thick crest connecting the mesocone and hypocone. The anterior entoloph (=anterior mure) is a crest that extends anteriorly from the mesocone, but does not connect with the protoloph because

Table 5. Measurements (in mm) for teeth of *Simiacritomys whistleri* new genus and species from Simi Valley Landfill Local Fauna.

N	Tooth	Dimension	OR	Mean	S.D.	CV
4	$M^{1 \text{ or } 2}$	A-P	1.68–1.82	1.73		
3		ANT-TR	1.79–1.90	1.83		
4		POST-TR	1.65–1.70	1.65		
3	M^3	A-P	1.30–1.38	1.34		
3		TR	1.45–1.55	1.50		
6	M_2	A-P	1.72–1.90	1.82	.08	4.6
6		ANT-TR	1.50–1.72	1.67	.10	5.7
6		POST-TR	1.59–1.90	1.71	.09	5.0
3	M_3	A-P	1.55–1.92	1.74		
3		ANT-TR	1.42–1.61	1.50		
3		POST-TR	1.24–1.42	1.34		

of the presence of the central transverse valley. The posterior cingulum is well-developed and a small incipient cusp (posterocone?) is present along this cingulum.

The M^3 exhibits the following characters. The occlusal outline is subtriangular, with the posterior aspect narrowed transversely. The anterior cingulum extends lingually from the anterolabial corner of the tooth to the protoloph. The protoloph appears to be a complete crest with a small, lingually directed spur (?metalophid II of Green, 1977). The protocone is a well-developed cusp that is situated slightly posteriorly of the midline along the labial aspect of the tooth. The hypocone is a transversely elongated cusp that is positioned posterolabially. A complete entoloph connects the protocone and hypocone with the mesocone. The mesoloph and metaloph are thick, moderately long crests that extend lingually from the mesocone and posterior entoloph, respectively. The metacone is an elongated cusp at the posterolabial corner of the tooth.

There is no tooth in the sample that can be positively identified as an M_1. The M_2 exhibits the following characters. The occlusal outline is slightly elongated anteroposteriorly, resulting in a subrectangular shape. The M_2 has a five-crested or lophed occlusal pattern with deep valleys between the cusps and the crests. The anterior cingulid is moderately well-developed. A distinct anteroconid is present along the anterior cingulid that sometimes connects with the base of the labial projection of the metaconid. A median transverse valley is usually present and divides the tooth into anterior and posterior portions. The metaconid, protoconid, entoconid, and hypoconid are large, rounded cusps. A deep valley divides the metalophid, midway along its length, and separates the metaconid from the protoconid. The mesoconid is a distinct cusp in the center of the ectolophid (=mure). The mesolophid is usually a long well-developed crest that is strongly connected to the mesoconid. The ectolophid is usually incomplete. A mesostylid is not present. The hypolophid is a thick, well-developed crest that connects the entoconid with the hypoconid. The posterior cingulid is a tall, well-developed crest that extends from the posterolingual aspect of the entoconid to the hypolophid, where it connects near the posterolingual aspect of the hypoconid. A hypoconulid is present as a distinct bulge or cusp along the posterior cingulid.

The M_3 is anteroposteriorly elongated and the occlusal outline is subrectangular. The anteroconid is a small distinct cusp along the anterior cingulid that is con-

nected to the labial projection of the metaconid. The anterior cingulid is smaller than those of the M_2 and it extends labially a short distance beyond the anteroconid. The metaconid and protoconid are well-developed cusps. The valley that divides the metalophid in the M_2 is usually interrupted in the M_3 by a more completely developed metalophid that usually forms a thin complete crest across this valley. The anterior ectolophid is a thick, complete crest that connects the protoconid to an indistinct mesoconid, whereas a posterior ectolophid is absent. The mesolophid is usually a long, thin crest that extends to the lingual aspect of the tooth. Short accessory spurs sometimes are present on the mesolophid. The hypolophid is a complete crest connecting the well-developed hypoconid with a very small entoconid. The posterior cingulid is a short distinct crest at the posterolingual aspect of the tooth.

Discussion.—Two teeth, an upper molar (LACM 130854) and a lower molar (LACM 130857), differ in the development of the crests and their connections relative to those of other molars assigned to *Simiacritomys*. In LACM 130854 (Fig. 6A), the anterior entoloph extends across the deep transverse valley, almost connecting with the protoloph, and the protoloph is complete. In LACM 130857 (Fig. 6D), the posterior ectolophid extends across the central transverse valley and connects with the hypolophid, whereas the anterior ectolophid is divided, midway along its length, by a deep valley. It could be argued that these variations are taxonomically significant and these specimens should not be referred to *S. whistleri*. However, these differences are regarded as intraspecific variation because, in other rodent species where large samples of teeth are available, a high degree of variability is observed (for example, see Lillegraven and Wilson 1975, and Green 1977). Furthermore, all the specimens were recovered from one locality and these molars, except for the characters noted above, have the same basic morphology as the other molars assigned to *S. whistleri*.

Simiacritomys whistleri is of uncertain affinities and is restricted to the late Duchesnean Simi Valley Landfill Local Fauna. As noted above in the discussion of the genus, *S. whistleri* is morphologically similar to the middle Arikareean to early Hemingfordian sicistine zapodid *Plesiosminthus grangeri* from South Dakota.

Conclusions

This report documents the discovery of new species and new geologic and geographic occurrences of middle and late Eocene rodents from the middle member of the Sespe Formation recovered during the Simi Valley Landfill Paleontologic Resource Impact Mitigation Program. The taxa discovered during the program are "*Namatomys*" sp., cf. "*N.*" *fantasma* Lindsay, "*Namatomys*" sp., *Paradjidaumo reynoldsi* new species, *Heliscomys* sp., *Simimys landeri* new species, and *Simiacritomys whistleri* new genus and species. New records from the middle member of the Sespe Formation in Simi Valley include "*Namatomys,*" *Paradjidaumo, Heliscomys,* and *Simiacritomys*. The occurrence of *Paradjidaumo* in the Simi Valley Landfill Local Fauna represents the second record of this genus in the Duchesnean. The occurrence of *Heliscomys* in the Simi Valley Landfill Local Fauna represents the second record of the genus and the family Heliscomyidae in the Duchesnean.

The results of this study and those summarized by Kelly and others (1991)

allow reevaluation of the Simi Valley Landfill Local Fauna. A revised faunal list for this fauna includes: *Sespedectes singularis* Stock (1935); *Proterixoides davisi* Stock (1935); *Leptotomus* sp. undetermined; "*Namatomys*" sp.; *Paradjidaumo reynoldsi* n. sp.; *Heliscomys* sp.; *Simimys simplex*; *Simimys landeri* n. sp.; *Simiacritomys whistleri* n. gen. and sp.; Camelidae, gen. and sp. undetermined; *Simimeryx* sp.; and Mammalia, gen. and sp. undetermined. The Simi Valley Landfill Local Fauna from LACM Loc. 5876 is characterized by the restricted stratigraphic ranges of the following taxa: "*Namatomys*" sp.; *Paradjidaumo reynoldsi*; *Heliscomys* sp.; *Simimys landeri*; *Simiacritomys whistleri*; and *Simimeryx* sp. The shared occurrences of *Sespedectes, Proterixoides,* "*Namatomys,*" *Paradjidaumo, Heliscomys, Simimys,* and *Simimeryx* indicate that the Simi Valley Landfill Local Fauna is late Duchesnean in age.

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Literature Cited

Black, C. C. 1965. Fossil mammals from Montana, part 2. Rodents from the early Oligocene Pipestone Springs Local Fauna. Ann. Carnegie Mus., 38(1):1–48.

Burke, J. J. 1934. New Duchesne River rodents and a preliminary survey of the Adjidaumidae. Ann. Carnegie Mus., 13(8):391–398.

Chiment, J. J. 1977. A new genus of eomyid rodents from the later Eocene (Uintan) of southern California. M.A. thesis, California State Univ., San Diego, v + 83 pp.

Dawson, M. R. 1966. Additional late Eocene rodents (Mammalia) from the Uinta Basin, Utah. Ann. Carnegie Mus., 38(4):97–114.

Emry, R. J. 1981. New material of the Oligocene muroid rodent *Nonomys*, and its bearing on muroid origins. Amer. Mus. Novitates, 2712:1–14.

———, and W. W. Korth. 1989. Rodents of the Bridgerian (middle Eocene) Elderberry Canyon Local Fauna of eastern Nevada. Smithsonian Contri. Paleobiol., 67:iii + 1–14.

Green, M. 1977. Neogene Zapodidae (Mammalia: Rodentia) from South Dakota. J. Paleont., 51(5);996–1015.

Kelly, T. S. 1990. Biostratigraphy of Uintan and Duchesnean land mammal assemblages from the middle member of the Sespe Formation, Simi Valley, California. Nat. Hist. Mus. Los Angeles Co., Contri. in Science, 419:1–42.

———, E. B. Lander, D. P. Whistler, M. A. Roeder, and R. E. Reynolds. 1991. Preliminary report on a paleontologic investigation of the lower and middle members, Sespe Formation, Simi Valley Landfill, Ventura County, California. Univ. California, Mus. of Paleont., Paleo Bios, 13(50):1–13.

Klingener, D. 1963. Dental evolution of *Zapus*. J. Mamm., 44:248–260.

———. 1964. The comparative myology of four dipodoid rodents (genera *Zapus, Napaeozapus, Sicista,* and *Jaculus*). Univ. Michigan, Mus. of Zool., Misc. Publ., 124:1–100.

———. 1966. Dipodoid rodents from the Valetine Formation of Nebraska. Univ. Michigan, Mus. Zool. Occ. Pap., 644:1–9.

Korth, W. W. 1989. Geomyid rodents (Mammalia) from the Orellan (middle Oligocene) of Nebraska.

Pp. 31–46 *in* Papers on fossil rodents, in honor of Albert Elmer Wood. (C. C. Black and M. R. Dawson, eds.), Nat. Hist. Mus. Los Angeles Co., Science Series, 33:xxi + 192 pp.

———, J. H. Wahlert, and R. J. Emry 1991. A new species of *Heliscomys* and recognition of the family *Heliscomyidae* (Geomyoidea: Rodentia). J. Vert. Paleont., 11(2):247–256.

Lillegraven, J. A., and R. W. Wilson. 1975. Analysis of *Simimys simplex,* an Eocene rodent (?Zapodidae). J. Paleont., 49(5):856–874.

Lindsay, E. 1968. Rodents from the Hartman Ranch Local Fauna, California. Univ. California, Mus. of Paleont., Paleo Bios, 6:1–22.

Mason, M. A. 1988. Mammalian paleontology and stratigraphy of the early to middle Tertiary Sespe and Titus Canyon Formations, southern California. Unpublished Ph.D. dissertation, Dept. of Paleont., Univ. California, Berkeley, 257 pp.

Russell, L. S. 1954. Mammalian fauna of the Kishenehn Formation, southeastern British Columbia. Ann. Rep., Natl. Mus. Canada 1952–1953, Bull., 132:92–111.

Setoguchi, T. 1978. Paleontology and geology of the Badwater Creek area, central Wyoming, part 16. The Cedar Ridge Local Fauna (late Oligocene). Bull. Carnegie Mus., 9:1–61.

Stehlin, H. G., and S. Schaub. 1951. Die Trigonodontie der simplicidentaten Nager. Schweizerische Naturforschende Gesellschaft, Schweizerischen Palaeontologischen Abhandlungen, 67:1–385.

Stock, C. 1935. Insectivora from the Sespe uppermost Eocene, California. Proc. Natl. Acad. of Sciences, 21:456–462.

Storer, J. E. 1984. Mammals of the Swift Current Creek Local Fauna (Eocene: Uintan, Saskatchewan). Saskatchewan Cult. and Rec. Mus. Nat. Hist., Nat. Hist. Contri., 7:1–158.

———. 1987. Dental evolution and radiation of Eocene and early Oligocene Eomyidae (Mammalia, Rodentia) of North America, with new material from the Duchesnean of Saskatchewan. Dakoterra, 3:108–117.

———. 1988. The rodents of the Lac Pelletier Lower Fauna, late Eocene (Duchesnean) of Saskatchewan. J. Vert. Paleont., 8(1):84–101.

Sutton, J. F., and C. C. Black. 1975. Paleontology of the earliest Oligocene deposits in Jackson Hole, Wyoming, part 1. Rodents exclusive of the family Eomyidae. Ann. Carnegie Mus., 45(16):299–315.

Walsh, S. L. 1987. Mammalian paleontology of the southern outcrops of the Mission Valley Formation, San Diego County, California. Senior thesis, California State University, San Diego, vii + 171 pp.

White, T. E. 1954. Preliminary analysis of the fossil vertebrates of the Canyon Ferry Reservoir area. Proc. U.S. Natl. Mus., 103(3326):395–438.

Wilson, R. W. 1935a. Cricetine-like rodents from the Sespe Eocene of California. Proc. Natl. Acad. of Sciences, 21:26–32.

———. 1935b. *Simimys,* a new name to replace *Eumysops* Wilson, preoccupied.—a correction. Proc. Natl. Acad. of Sciences, 21:179–180.

———. 1949. Additional Eocene rodent material from southern California. Carnegie Inst. of Washington Publ., 584:1–25.

Wood, A. E. 1937. The mammalian fauna of the White River Oligocene, part II. Rodentia. Trans. Amer. Philos. Soc., new ser., 28:155–269.

———. 1974. Early Tertiary vertebrate faunas Vieja Group Trans-Pecos Texas: Rodentia. Texas Memorial Mus. Bull., 21:1–112.

———. 1980. The Oligocene rodents of North America. Amer. Phil. Soc., 70(5):1–68.

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